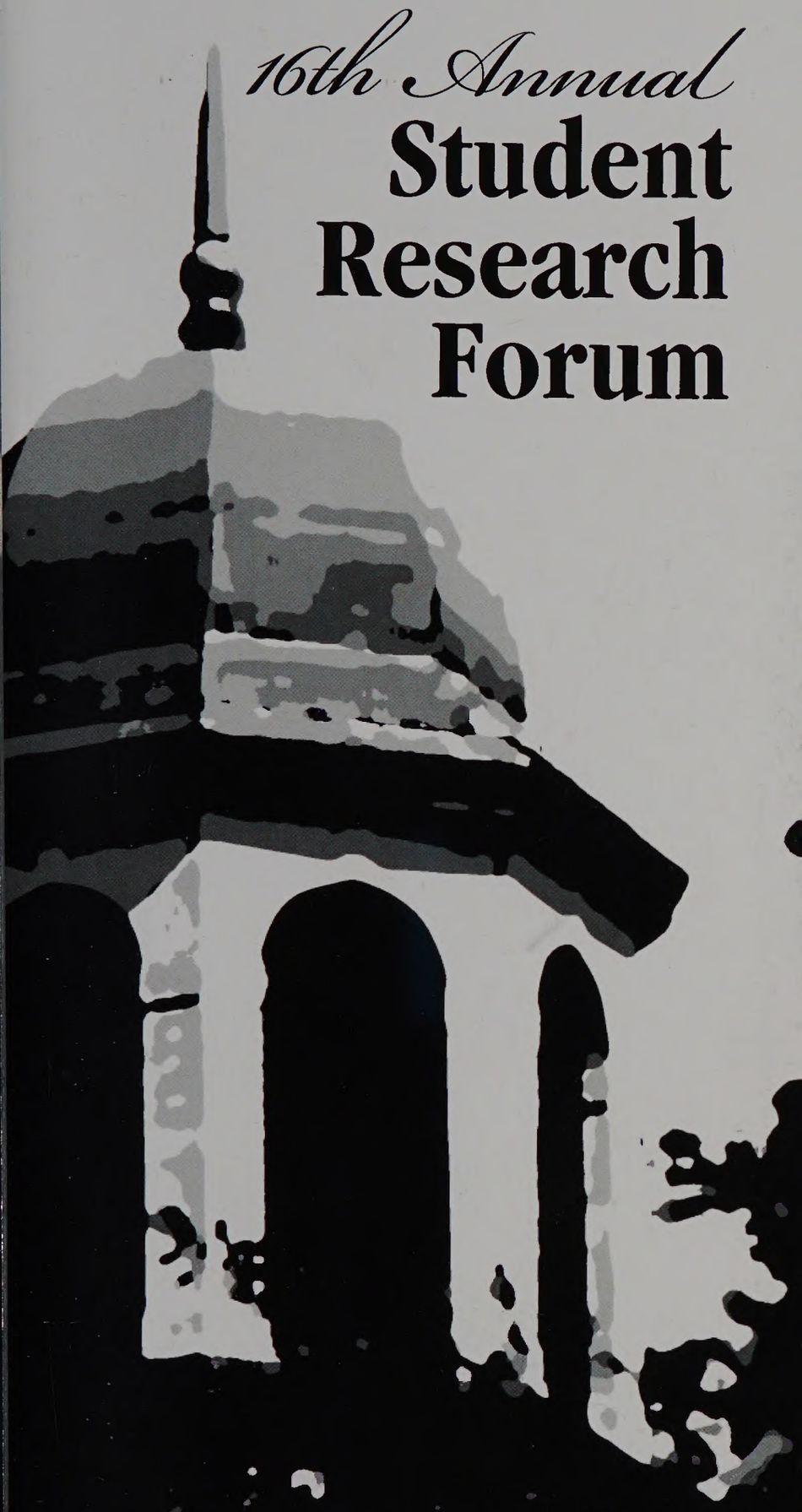
16th Annual

Student Research Forum



April 19 & 20, 2007

Centenary

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16th Annual Student Research Forum

April 19 & 20, 2007

Posters
(Mickle Hall first floor)
11:00 A.M.
April 19, 2007

Natural Sciences
Carlile Auditorium
(Mickle Hall first floor)
12:55 – 5:00 P.M.
April 20, 2007

Social Sciences
Kilpatrick Auditorium
(Smith Building)
1:25 – 2:30 P.M.
April 20, 2007

Humanities
Kilpatrick Auditorum
(Smith Building)
2:40 – 3:20 P.M.
April 20, 2007

16th Annual Student Research Forum

SPONSORED BY

CENTENARY BOOK BAZAAR

DR. DARREL COLSON
PROVOST AND DEAN OF THE COLLEGE

JUDGES

DR. PHILIP BARKER ..... *Assistant Professor of Political Science*
DR. DAVID BIELER ..... *Associate Professor of Geology*
DR. GREG BUTCHER ..... *Assistant Professor of Neuroscience*
DR. CHRISTOPHER CIOCCHETTI ..... *Assistant Professor of Philosophy*
DR. DANIEL HENDERSON ..... *Visiting Assistant Professor of Exercise Science*
DR. ROBERT PRICKETT ..... *Assistant Professor of Education*
DR. ROSS SMITH ..... *Associate Professor of Music*

FROM THE DIRECTOR

The annual Student Research Forum provides Centenary students an opportunity to showcase their talents and experiences. They are to be commended for their efforts and work.

Thank you research participants and advisers for doing the projects and presenting your work in this forum.

Judges, thank you for your time and effort. Your feedback benefits our students and your time and attention validates their work.

Special thanks is expressed to the Centenary Book Bazaar for their financial support. We greatly appreciate it!

Sincere thanks is given to the Provost and Dean of Centenary, Dr. Darrel Colson, for all of his financial support, encouragement, and attention.

Thank you Ms. Jeannie Clements, Office of the Provost, for your work on planning the forum, designing/producing the brochure and the T-shirts, room arrangements, refreshments, etc. You are the best and much of our success is credited to you!

Thanks also goes to Ms. Sherry Heflin for her work in preparing the brochure and t-shirts.

DR. MATTHEW WEEKS, *Director*
16th Annual Student Research Forum

POSTER PRESENTATIONS/JUDGING

* Presentation and judging will take place on Thursday, April 19th at 11:10am on the second floor of Mickle Hall. In preparation of the judging, presenters should have their posters in place and ready at their assigned locations no later than 11:00 a.m.

Jillian Kennedy.....Biology
Lauren Mills.....Physics
Rebecca Hill.....Chemistry
Heinz Runge.....Neuroscience
Advanced Neuroscience Class.....Neuroscience
Mary Walter.....Psychology
Deana Apple.....Neuroscience

ORAL PRESENTATIONS/JUDGING

* Presentation and judging will take place on Friday, April 20th. Locations and starting time vary by division.

NATURAL SCIENCES
in Carlile Auditorium

12:55 P.M.	Provost Darrel Colson	Introduction/Welcome
1:00 P.M.	Kelly Waterhouse	Chemistry
1:10 P.M.	Cody Andrews	Chemistry
1:20 P.M.	Emily Davis	Chemistry
1:30 P.M.	Matthew Clark	Chemistry
1:40 P.M.	Georgette Lang	Chemistry
1:50 P.M.	Georgette Lang	Chemistry
2:00 P.M.	Brett Martin	Chemistry
2:10 P.M.	Kiley Pulliam	Physics
2:20 P.M.	J. T. Kohrs	Physics
2:30 P.M.	Justin Bailey	Physics
2:40 P.M.	Roy Paterson	Physics
2:50 P.M.	Brandon Walker	Physics

BREAK
3:00 P.M. – 3:20 P.M.

NATURAL SCIENCES *(continued)*
in Carlile Auditorium

3:20 P.M.	Julia Reynolds	Biophysics
3:30 P.M.	Courtney Rome	Biophysics
3:40 P.M.	Victor Kha	Biology
3:50 P.M.	Michelle McNamara	Biology
4:00 P.M.	Emma Rayburn	Biology
4:10 P.M.	Kelly Hunt	Biology
4:20 P.M.	Clinton Scates	Biology
4:30 P.M.	Travis Reese	Biology
4:40 P.M.	Matthew Wallac	Biology
4:50 P.M.	Jeremy Fagan	Biology

Natural Sciences Oral Presentations end about 5:00 P.M.

SOCIAL SCIENCES
in Kilpatrick Auditorium

1:25 P.M.	Provost Darrel Colson	Introduction/Welcome
1:30 P.M.	Maryilyn Deese	Psychology
1:40 P.M.	James Frantz	Psychology
1:50 P.M.	Mary Smith	Psychology
2:00 P.M.	Heather M. Kasparek	Business
2:10 P.M.	Robert Trempski	Finance
2:20 P.M.	Rachel E. Powell	Sociology

Social Science Oral Presentations end about 2:30 P.M.

HUMANITIES
in Kilpatrick Auditorium

2:40 P.M.	Lori Von Pingel	English
2:50 P.M.	Roxie Smith	English
3:00 P.M.	Ashley Layman	English
3:10 P.M.	Weston Schild	Religious Studies

Humanities Oral Presentations end about 3:20 P.M.

POSTERS

Note: "" Denotes presenter(s) in multi-author works.*

UNDERSTANDING THE DIFFERENTIAL EFFICIENCY OF PALMITOYLATION OF TWO C-TERMINAL CYS RESIDUES

JILLIAN KENNEDY [a]
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Centenary College of Louisiana
[b] Department of Biochemistry
Louisiana State University Health Sciences Center-Shreveport

RESEARCH ADVISORS
Dr. Cynthia J. Brame [a]
Dr. Lucy C. Robinson [b]

Yck2 (Yck=Yeast casein kinase 1) is one of a pair of redundant plasma membrane-associated protein kinases essential for yeast viability. Yck2's carboxyl terminus contains two terminal Cys residues which are post-translationally palmitoylated, anchoring Yck2 in the plasma membrane. Previous experiments have demonstrated that mutation of each Cys residue results in different localization. The purpose of this experiment was to determine if location of the palmitoylated Cys (ultimate or penultimate residue) affects Yck2 palmitoylation and, thus, localization. We reasoned that Yck2 localization could be determined by 1) distance of the Cys residue from the carboxyl terminus or 2) distance of the Cys residue from the uncharacterized recognition sequence upstream. We generated a mutation to distinguish between these possibilities, deletion of the terminal Cys (ΔC). We compared this mutant with conversion of each cysteine separately to Ser (CS and SC). All mutations were made as GFP:Yck2 fusions so we could assess localization using fluorescence microscopy. We found that the ΔC mutant, like the CS mutant, exhibited plasma and other membrane association, while the SC mutant exhibited apparently soluble protein fluorescence. We conclude that differential palmitoylation of Yck2 Cys residues is determined by distance of the target Cys from the upstream recognition site.

NITRIC OXIDE ISOTOPE TRACING AT BIOLOGICAL TRACE LEVELS

*LAUREN MILLS, MARTIN FEELISCH, MATTHEW G. GRISHAM AND DR. JUAN RODRIGUEZ
Department of Physics
Centenary College of Louisiana

The many roles of nitric oxide (NO) in biology and its tremendous therapeutic applications have drawn much attention to this molecule; yet little is still known on the chemical mechanisms that enable NO to achieve these roles in living systems. Here we describe new methodology, based on isotope labeling, for identifying and quantifying biochemical sources and targets of NO, in tissues and in biological fluids at biological trace levels. To detect ^{14}NO and the stable isotope ^{15}NO we have adapted a chemical assay, designed originally for chemiluminescence detection, to take advantage of mass spectrometric detection. Using a standard Sievers reaction vessel, coupled to an HP GCD1800A gas chromatograph / mass spectrometer via cryogenic focusing in a 1 ml loop, we were able to reach detection limits of 10 pmol and 50 pmol for ^{14}NO and ^{15}NO isotopes, respectively. The difference in detectability currently arises from oxygen contamination contributing to the background at ^{15}NO, due to the limited mass selectivity of our instrument. A mass spectrometer upgrade, now under way, is expected to improve our sensitivity and selectivity manifold to where the limit of detection for both ^{14}NO and ^{15}NO isotopes should reach the single pmol range. At these levels our mass spectrometric approach should greatly expand the analytical capabilities available to the field of NO Chemical Biology.

SEPARATION OF ETHANOL FROM FERMENTATION BROTH DURING THE PRODUCTION OF FUEL ETHANOL

*REBECCA HILL [a], CLIFFORD E. GEORGE [b], AND TRACY BENSON [b]
[a] Department of Chemistry
Centenary College of Louisiana
[b] Dave C. Swalm School of Chemical Engineering
Mississippi State University

In this study, a hydrophobic, polypropylene, hollow fiber membrane module model G543 manufactured by Liqui-Cel was used to evaluate the effectiveness of the perstraction of ethanol from a mixture of ethanol and water. The fiber membrane had an outer diameter of 300μm and an inner diameter of 200μm. Solutions of ethanol in water at concentrations of 10, 7.5, and 5 weight percent ethanol were used as the simulated fermentation broth. 1-octanol,

tri-*n*-butylphosphate, 2-ethyl-1-butanol, and water were used as the solvents. Water proved to be the most effective and the least toxic solvent. Fick's Law diffusion coefficients were determined for ethanol diffusing from the shell side to the lumen side of the membrane. Experimental results indicate that as the flow rate of solvent on the lumen side increases, the diffusion coefficient decreases. Also, the dependence of temperature on diffusion coefficient of the ethanol-water solvent system was studied at 22, 30, and 35 degrees Celsius. The diffusion coefficient varied from a minimum value of 3.58E-11 m^2/s at 22 Co to a maximum of 1.38E-09 m^2/s at 35 C° over the range of concentrations and flow rates tested.

FIGHTING ADDICTION

HEINZ RUNGE [a]
Department of Biology [a]
Department of Psychology [b]
Centenary College of Louisiana

RESEARCH ADVISOR
Dr. David Stafford [b]

Cocaine is a highly abused drug, with an estimated 1.5 million people either dependent on or abusing the drug in 2002. The effects cocaine has on anxiety increases its addictive qualities. Research has been conducted using different drugs to reduce anxiety, which in turn would reduce the drug-seeking behaviour. Currently, I am working on research involving a drug combination which is showing some success in reducing this behaviour in animal models. The combo being researched is Oxazepam, which reduces anxiety, and Metyropone, which is mainly used to stabilize the liver from the side-effects of Oxazepam. Both of these drugs have already been approved by the FDA for human use.

THE EFFECT OF LEARNING ENVIRONMENTS ON NEUROGENESIS

BRITTANY BJERKE, RICHARD DAVIS, BRAD KRAEMER,
ABIGAIL PIAZZA, HEINZ RUNGE, RINA TZENG
** Note: Authors listed in alphabetical order*
Advanced Neuroscience Class
Department of Biology
Centenary College of Louisiana

RESEARCH ADVISOR
Dr. Greg Butcher

Current research has dispelled the myth that organisms are born with a full set of neurons and will never produce any more. It is now known that in some areas of the brain, neurogenesis, the growth of new neurons, can and regularly occurs. These experiments, involving crawfish and mice, sought to determine how learning environments affect neurogenesis. The first experiment sought to assess neurogenesis in Clusters 9 and 10 of the brains of crawfish. Crawfish were divided into two groups, testing experimental conditions affecting neurogenesis. They were fed regularly and after two weeks were injected with Bromodeoxyuridine (BrdU), a marker for cell growth. After forty-eight hours, the brains of the crawfish were collected. The second experiment sought to assess neurogenesis in the hippocampus of mice. Mice were divided into three groups—one with a stationary environment, one with a changing environment and one with an impoverished (control) environment. They were given free access to food and water and after six days were injected with BrdU. After forty-eight hours, the brains of the mice were collected for processing. The collected tissues were labeled and stained in order confirm neurogenesis had taken place.

COGNITIVE DECLINE IN MIDDLE AND LATER ADULTHOOD

MARY WALTER
Department of Psychology
Centenary College of Louisiana

RESEARCH ADVISOR
Dr. Amy Hammond

This project reviews the literature on cognitive decline in later life. Specifically, I compare and contrast multiple approaches and studies to cognitive aging. Most of the current literature suggests that cognitive decline is inevitable in later life, but also that these declines do not occur uniformly across all types of cognitive processes. In particular, memory types are affected in different ways, for example, memories of an event in the past and memories of facts and events are less affected by cognitive decline than language. I conclude with theory-based tips that may help to lessen this decline.

LOCALIZATION OF RSKS AND MSKS WITHIN THE SCN

DEANA APPLE
Department of Biology
Centenary College of Louisiana

ADVISOR
Dr. Greg Butcher

Extracellular regulated kinase (ERK)- regulated kinases function as an intermediate step in the mitogen activated protein kinase (MAPK) pathways of the mammalian central suprachiasmatic nucleus (SCN). Ribosomal S6 kinases (RSKs) and mitogen and stress activated protein kinases (MSKs) are activated by ERK and have the potential to phosphorylate the CRE-binding protein (CREB), a transcription factor involved in the expression of clock genes within the SCN. These molecular pathways have been shown to affect the biological process of entrainment that relates to circadian rhythms, which are controlled by the SCN. The specific locations of RSKs and MSKs within the SCN are currently unknown. This project aims to identify cell-specific markers that are co-expressed with RSKs and MSKs. locations of high density of each kinase in order to better understand the effect each has on processes required by the organism. Immunohistochemical labeling of arginine vasopressin (AVP)- and calbindin- specific antibodies will be utilized in order to determine which specific pathways exhibit activation of CREB in response to circadian cues.

Natural Sciences

Proteomic analysis of cultured cells in the presence of carbon nanomaterials

* KELLY A. WATERHOUSE [a], DIANNE HAMMOND [b], ANTONY JEEVARAJAN [b], JANICE HUFF [b], KELLEY BRADLEY [b], JODIE L. CONYERS [c], AND VALERIE MOORE [c]
[a] Department of Chemistry
Centenary College of Louisiana
[b] Human Adaptations and Countermeasures Office
Johnson Space Center, Houston, TX
[c] University of Texas Health Science Center,
Houston, TX

The carbon fullerene DF-1 holds promise as a potent free radical scavenger, and is therefore being analyzed for use as an in vivo radioprotective agent. Preliminary studies with DF-1 have shown no negative effects on cell viability or cell proliferation. In the present study, we sought to extend this preliminary work by using global protein profiling as an indicator of DF-1 compatibility with living cell systems. Two types of cells (HUVEC and HepG2) were cultured in the presence and absence of 10 μM DF-1 in the media for 24 hrs. Cells were lysed with a 9M urea buffer and were analyzed using a Ciphergen (SELDI-TOF) mass spectrometer. Protein profiles were inspected for gross alterations. The results of these experiments showed minimal to no effect of DF-1 on the proteomic profiles of both liver and endothelial cells. Therefore, DF-1 continues to have great potential for use in vivo with negligible toxicity.

Studies of Compounds from *Asclepias* Milkweeds

CODY ANDREWS
Department of Chemistry
Centenary College of Louisiana

Cardenolides are pharmacologically active (C23)-steroids commonly found in many species of *Asclepias* milkweeds. Despite extensive research, many cardenolides remain unidentified, providing a great opportunity for further study. Cardenolides were first extracted from milkweeds and purified by various chromatographic methods. The purified samples were then analyzed using gas chromatography-mass spectroscopy (GC-MS), nuclear magnetic resonance (NMR), and thin-layer chromatography (TLC) and compared to previously identified samples.

Studies of Compounds from *Asclepias* Milkweeds

CODY ANDREWS & EMILY DAVIS*
Department of Chemistry
Centenary College of Louisiana

Research Advisor
Dr. Ron Martin

Various techniques were employed in the study of compounds from different species of *Asclepias* milkweeds which are of interest in both the study of the Monarch butterfly and as components in pharmaceuticals. Gas chromatography and mass spectroscopy were used in order to evaluate the compounds and provide experience in using diagnostic techniques in a laboratory setting. Compounds from milkweeds were separated and purified using three types of liquid chromatography: flash chromatography, small scale liquid chromatography, and dry column chromatography. The purification process was verified through through thin layer chromatography. Nuclear magnetic resonance was used to identify previously studied cardenolide compounds, as well as to compare commercially available cardenolides and pregnanes to the unidentified compounds from several milkweed plant species.

Perfluoroalkylation of Benzene by Iron Perfluoroalkyl

* MATTHEW P. CLARK & DR. JOSHUA D. LAWRENCE
Department of Chemistry
Centenary College of Louisiana

Over 20% of pharmaceuticals and 40% of agrochemicals contain at least on F atom. Fluoroorganics are so prevalent because (1) fluorine atoms stabilize pharmaceuticals compounds in the body, (2) fluoroorganics are more lipophilic, and (3) fluoroorganics can be tracked more easily in the body. Aryl-CF3 compounds are currently used as antidepressants (Prozac), anti-inflammatories (Celebrex), and hormone therapies (Flutamide). Unfortunately, CF3 groups must be incorporated at the beginning of the syntheses of pharmaceuticals. We are investigating a reaction that would allow for the addition of these perfluoroalkyl groups at any point in a synthetic sequence. This would allow researchers increased synthetic versatility, and should also reduce the time needed to make new pharmaceutical candidates. As a model reaction, we are studying the iron-mediated addition of the C_4F_9 group to benzene. We have found

that $[Fe(CO)_3(\mu\text{-}I)(C_4F_9)]_2$, is a more effective perfluoroalkylation reagent than the reported $[Fe(CO)_4I(C_4F_9)]$. Our attempts to prepare other dimeric perfluoroalkyl compounds ($[Fe(CO)_3(\mu\text{-}OPh)(C_4F_9)]_2$ and $[Fe(CO)_3(\mu\text{-}OMe)(C_4F_9)]_2$, and to assay their perfluoroalkylation activity will be described.

ATTEMPTED LIGATION-DETECTED PERFLUOROALKYLATION OF HETEROARENES

* GEORGETTE LANG, MATTHEW P. CLARK,
& DR. JOSHUA D. LAWRENCE
Department of Chemistry
Centenary College of Louisiana

Fluorinated organic molecules comprise a large percentage of pharmaceuticals. Using a CF_3 group in place of H, Cl, or F gives increased lipophilicity, a very important aspect of pharmacological activity. Trifluoromethyl analogues of existing biologically active compounds could show increased biological activity compared to the existing compounds. Aryl-CF_3 groups could be incorporated using C-H bond activation. C-H bond activation is known to provide more direct routes to polyfunctional aromatic compounds, but can be plagued by poor site selectivity. We will report our attempts to use $Fe(C_4F_9)(I)(CO)_4$ as a ligation-directed perfluoroalkyation reagent. We will report the synthesis and characterization of $Fe(C_4F_9)(\mu\text{-}I)(\text{pyridine})(CO)_3$, and $Fe(C_4F_9)(\mu\text{-}I)(\text{N-methylimidazole})(CO)_3$. The perfluoroalkylation activity and electronic structure of these new species and the parent $FeI(C_4F_9)(CO)_4$ compound will be compared.

EVALUATING THE EFFECTIVENESS OF COMMERCIALLY AVAILABLE CLEANERS ON MARBLE GRAVESTONES

GEORGETTE LANG [a], JASON CHURCH [b], & MARY STRIEGEL [b]
[a] Department of Chemistry
Centenary College of Louisiana
[b] National Center for Preservation Technology and Training

A joint partnership between the National Center for Preservation Technology and Training and the VA's National Cemetery Administration initiated a project to investigate the effects of currently-used gravestone cleaners on the marble gravestones from five VA cemeteries across the US. The project investigates which cleaner is the best at removing biological growth and which is least abrasive to the stone. The five cleaners analyzed in this study were Daybreak, World Environment Groups Marble Cleaner,

$H_2Orange_2$ Grout Safe, D_2 Architectural Antimicrobial, and Kodak Photo-Flo. Water was used as a control. Stones were placed in the various cemeteries and cleaned. Initial tests were done to evaluate the cleaners' effectiveness and after 18 months the stones were tested for any chemical or physical changes. Initial results show that Daybreak was the most effective cleaner at removing and preventing biological growth. Initial results also show that there were no noticeable chemical or physical changes to the stone's surface. A laboratory experiment was also begun that would simulate the effect that the cleaners would have on the stones in the cemeteries after several years as opposed to only 18 months.

GLU-TRNA^{GLN} IDENTITY ELEMENTS FOR GATDE

* BRETT MARTIN [a], KELLY SHEPPARD [b], LYNN SHERRER [b], AND DIETER SÖLL [b]
[a] Department of Chemistry
Centenary College of Louisiana
[b] Yale University

There are two known pathways of $tRNA^{Gln}$ formation. In Eukaryotes, its formation proceeds by directy aminoacylation of Gln onto $tRNA^{Gln}$ by a glutaminyl-tRNA synthetase. In prokaryotes, it proceeds via an indirect pathway in which a non-discriminating glutamyl-tRNA synthetase forms Glu-$tRNA^{Gln}$ followed by subsequent transamidation with Glu-$tRNA^{Gln}$-dependent (Glu-AdT) amindotransferase. GatDE, a Glu-Adt, has high affinity for GatDE and recognizes Glu-$tRNA^{Gln}$ instead of Glu-$tRNA^{Glu}$. Here we attempt to isolate identity elements of $tRNA^{Gln}$ that enable such high specificity. The co-crystal structure of $tRNA^{Gln}$ with GatDE has been recently determined revealing that the enzyme does not have contact with the anticodon arm of the $tRNA^{Gln}$ but instead contacts the acceptor stem, D-loop, and T-arm of the tRNA. We report here some elements of these tRNA segments that are essential for the specificity of GatDE as well as current work to isolate further identity elements.

COSMIC RAY MUON DETECTION USING A SODIUM-IODIDE [NAI(TI)] SCINTILLATION DETECTOR

* KILEY PULLIAM & DR. JUAN RODRIGUEZ
Department of Physics
Centenary College of Louisiana

Cosmic rays are high energy charged particles of galactic and extra-galactic origins that are constantly striking the Earth's surface.

Primary cosmic ray particles are mostly protons, helium nuclei, and electrons. Secondary particles are produced by the interaction of primary particles in the Earth's atmosphere. Unstable mesons that decay into muons are the most commonly observed secondary particle with energies ranging from 100 KeV to 10 GeV depending on the source. Here we show how gamma rays from muons can be detected using a sodium-iodide scintillation crystal attached to a photomultiplier tube and Maestro-32® analysis software (Ortec® Oakridge, TN). As the detector and the software are not sold for the purposes of counting and analyzing cosmic ray muons, adjustments were made. Since cosmic rays are generally in an energy range greater than what the software is designed to detect under normal circumstances, the voltage setting on the detector was decreased allowing an increase in the range of energies the software could display. Using the lower voltage and scan recalibration, cosmic ray muons were detected.

Measuring Nitric Oxide Bound to S-Nitrosoglutothione Using UV Light Spectroscopy and a One-meter Capillary Cell

* J. T. KOHRS & BRETT MARTIN
Department of Physics
Centenary College of Louisiana

Research Advisor
Dr. Juan Rodriguez

Nitric oxide is thought to play important roles in biological systems. However, methods for detecting the molecule when bound to an amino acid are currently controversial. Nitric oxide can exist freely as well as bound to sulfur atoms in cystine amino acids. Because peptides with nitric oxide bound exhibit a greater absorption of light at 340 nm than peptides without, the amount of bound nitric oxide can be measured by the difference in absorption between the peptide with bound nitric oxide and the peptide itself. Intense ultraviolet light of wavelengths near 340 nm has been found to cleave nitric oxide bound to peptides. Also, biological systems typically have extremely low concentrations of bound nitric oxide, so a one-meter capillary tube was used over the traditional decimeter path length to amplify the absorption measurements. Preliminary results indicate that this method affords sufficient sensitivity to detect S-NO compounds at levels associated with inflammatory diseases.

Digital Bifocal Prescription Method

* JUSTIN BAILEY & DR. JUAN RODRIGUEZ
Department of Physics
Centenary College of Louisiana

The two measurements needed to prescribe bifocals are the segment height, SH, and pupillary distance, PD. Measuring PD is accomplished with an expensive device and SH with a Sharpie. Seeing room for improvement we decided to create a better method. The process has been digitized using a black and white security camera with an infrared filter to capture the patient's face. By then selecting specific points on the image both SH and PD can be calculated and returned to the user. Inputting the nose bridge width allows calibration in millimeters. Using near-infrared capture contrasts the pupil and cornea allowing the user to distinctly select the pupil. Specific lighting placement has prevented glare on the pupils, which interrupts the selection. Preliminary results indicate the method will be within standard tolerance of ±0.5mm for SH. Using a controlled image with a measured SH of 22.75mm and PD of 94.6 mm, the program returned a SH of 22.9mm and PD of 96.3mm.

Viscosity and the Sol-Gel Process

CHUN YANG, * ROY PATERSON, AND DR. JUAN RODRIGUEZ
Department of Physics
Centenary College of Louisiana

The sol-gel process, in which a colloidal liquid solution forms a solid gel used for the making of ceramic materials, forms different materials that are characterized by the viscosity of the solution used. Experiments were conducted on Knox gelatin in order to gain a fundamental understanding of viscosity as it relates to this sol-gel process. A sphere-drop method was conducted in order to measure the viscosity of the solution through the use of Stokes' Law. A temperature probe and a ^{1}H NMR machine were then used during the sol-gel process to find the temperature change and T_2 relaxation time respectively. The T_2 and temperature data were correlated with the viscosity data to infer how energy and structure relates to viscosity. Viscosity was found to rise sharply at the sol-gel transition, while the T_2 time dropped off suddenly during this transition time. However, no discontinuity in the temperature was found as would be expected due to a significant phase shift, instead it correlated with what would be expected in accordance with Newton's Law of Cooling.

REACTION CELL: THE TRIALS AND TRIBULATIONS

* BRANDON WALKER & DR. JUAN RODRIGUEZ
Department of Physics
Centenary College of Louisiana

Mass spectrometers are among the most sensitive instruments for the analysis of highly volatile substances in gases, but their use for the analysis of dissolved molecules is very limited. Here we describe the construction of a reaction cell made of inert Teflon that can simultaneously purge molecules from solutions and carry then directly to the input of a mass spectrometer. Our cell houses reaction liquids inside their inner chambers with semi permeable hydrophobic membranes that allow gas flow but act as barriers so liquid cannot escape into the lines. Ideally, the mass spectrometer should receive a signal within two minutes of the initiation of the experiment at a low flow of 1 ml/min. The major problem currently facing the project is the lack of flow within the cells. Currently an experiment using three test cells of varied characteristics has been created to understand what differences affect the success of the device.

UTILITY OF DENDROFULLERENE DF-1 NANOPARTICLES FOR RADIOPROTECTION IN CELLS

*JULIA REYNOLDS [a], HEIDI HOLTORF [b], JANICE HUFF [b], KELLEY BRADLEY [b], VALERIE MOORE [c], JODIE L. CONYERS [c]
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Centenary College of Louisiana
[b] Human Adaptations and Countermeasures Office
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[c] Office of Biotechnology
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Houston, TX

The development of atherosclerosis and other degenerative changes in the human cardiovascular system are known health consequence following exposure to ionizing radiation, and are thus a concern for astronaut health following long duration space flight. The goal of this project was to assess the ability of a C_{60}-derivative, DF-1, to mitigate cellular damage resulting from low dose radiation exposure. DF-1 is a water soluble C_{60} fullerene encapsulated by dendrimeric functional groups and is proposed to exhibit antioxidant properties. We utilized human umbilical vein endothelial cells as a model system for study of the human vasculature. These cells were subjected to varying doses of X-ray irradiation in the presence and absence of DF-1, and the production of reactive oxygen species, secretion of pro-inflammatory markers, and cell viability were measured.

LYMPHANGIOGENESIS IN A HUMAN LYMPHATIC ENDOTHELIAL CELL LINE IN RESPONSE TO INFLAMMATORY CYTOKINES

* COURTNEY ROME [a], MERILYN JENNINGS [c], SHERRY JACKSON [c], & J. STEVEN ALEXANDER [c]
[a] Department of Biology
[b] Department of Physics
Centenary College of Louisiana
[c] Department of Cellular & Molecular Physiology
LSU-Health Sciences Center

RESEARCH ADVISORS
Dr. Beth Leuck [a]
Dr. Juan Rodriquez [b]

The lymphatic system is responsible for removing excess interstitial fluid from body tissues, especially during inflammation. Lymphangiogenesis is the growth of new lymphatic vessels. My project was to isolate human lymphatic endothelial cells (LECs) from a mixture of human microvascular blood and lymphatic endothelial cells (HMECs), clone the isolated cells, and test these cells for their ability to form capillary tubes (lymphangiogenesis) and also examine the effects of inflammatory cytokines on this process. To accomplish this, a serial dilution cloning strategy of HMECs was performed. The diluted cells were plated such that there would be one cell in every other well of a 48-well plate. Some of these plates consisted of LECs while others held human blood vessel endothelial cells. Cloned cells were analyzed via Western blotting to determine whether they expressed lymphatic or blood vessel cell markers. The cloned LEC cultures were then spiked with the following cytokines, TNF-_, IL-1_, and INF_, and observed for tube formation. We found that inflammatory cytokines produced diminished tube formation consistent with the alteration of lymphatics in inflammation. An improved understanding of this process using this model system will enhance our ability to design therapies for the treatment of chronic inflammation.

Effects of Combination Treatment with Notch Inhibitor, Proteosome Inhibitor, and mTOR Inhibitor on Estrogen Receptor Negative Human Breast Cancer Cell Line MDA-MB-231

*VICTOR KHA [a], DR. AMANDA SUN, M.D./PH.D. [b],
DR. YUN SUN, M.D. [b], & DR. THOMAS YONG, PH.D. [b]
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Three new anti-tumor agents, proteosome inhibitor, mTOR inhibitor, and Notch sigaling inhibitor are currently undergoing either phase I or phase II clinical studies in breast cancer. However, the combined effects of these agents are largely unknown. The research presented here intends to investigate in an *in vitro* system to see if there are any synergistic effects between these agents. The results will provide information on the design of future clinical trials of combination therapy in breast cancer patients. MDA-MB-231, an estrogen receptor negative human breast cancer cell line, was used for *in vitro* studies. Gamma secretase inhibitor, a Notch signaling inhibitor, Bortezomib, a proteosome inhibitor, and Rapamyocin, an mTOR inhibitor were added to the cells either alone or in two drug combinations. Cell survival and apoptosis were measured after drug treatment. MDA-MB-231 cells were found to be very sensitive to Notch inhibition; however, they were relatively resistant to proteasome or mTOR inhibition alone. The combination treatment with GSI and Bortezomib demonstrated synergy and suggest that the apoptotic resistance of cancer cells can potentially be overcome through the combined effect of these two drugs. Therefore, targeting both pathways may be a valid therapeutic approach for this type of cancer cell line.

The Effects of Modified DNA and RNA Nucleotides on DNA and RNA Primer Extensions

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Modified nucleotide triphopsphates have a wide variety of biological applications. Two such modifications include the addition of Biotin-16 and the addition of Amino adenylate to otherwise natural triphosphates. The addition of Amino adenylate and Biotin-16 aids in the labeling of DNA and RNA. In additon, biotinalyated DNA and RNA triphosphates assists in the attachment of DNA and RNA to streptavidin covered surfaces. Once a short sequenced RNA primer is added to the DNA/RNA, a modified nucleotide and enzyme are added to induce extension of the DNA/ RNA strand. The rate of DNA/ RNA extension of the natural triphosphate was then compared to the rate of extension of the DNA/ RNA strand containing the modified nucleotide. Biotinylated and Amino adenlayted triphosphates can then be used to label and locate specific nucleotide sequences and modified nucletoide triphosphates. In addition biotinylated triphosphates can then be attached to streptavidin covered surfaces. The biotin-streptavidin complex is an extremely stable structure with a high binding energy that can withstand a wide variety of pH and temperature environments. The biotin streptavidin complex has then been used in the engineering of a wide variety of pharmaceutical products.

Increased Lymphangiogenesis in Mice with Experimental Colitis

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Inflammatory angiogenesis (formation of new blood vessels from existing vessels) in the microcirculation is known to occur during acute and chronic inflammation and appears to contribute to the pathophysiology of acute and chronic inflammation

through conversion to an inflamed phenotype characterized by increased permeability and enhanced binding of leukocytes. Lymphangiogenesis, the parallel process for generating lymphatic vessels, may be important in relieving tissue edema and providing an exit conduit for immune cells, but it has not been studied in many models of inflammation. Here we used a lymphatic reporter mouse (kB-lac Z) in the DSS (dextran sodium sulfate) model of colitis, a model of acute intestinal inflammation. We found that although lymphatics were rare in the colon, they were dramatically increased in a time-dependent fashion following the initiation of colitis. Further, disease activity was found to parallel the abundance of colon lymphatics. These data were also correlated with evidence of histopathologic injury seen by haematoxylin/eosin staining. We conclude that lymphangiogenesis is significantly increased in intestinal injury; future studies will be needed to determine lymphatic regression during restitution and how induction of lymphangiogenesis ameliorates disease.

Comparison of 3 Different Chemopreventative Agents on Invasion of Stat3-Transfected Human MDA-MB-231 Breast Cancer Cells *In Vitro*

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Signal transducer and activators of transcription (STATs) are cytoplasmic proteins responsible for transmitting extracellular signals to the nucleus. Expression of constitutively active Stat3 is present in epithelial carcinogenesis. While inhibiting the Stat3 pathway is a potential therapy for skin carcinoma, it is unknown if this mechanism can treat other carcinomas. We hypothesized that the antioxidant compounds ACA and EGCG and the chemotherapeutic agent ATRA may be used to target Stat3 in the aggressive human breast adenocarcinoma cell line MDA-MB-231. If Stat3 is the common target of these compounds, then they should be less effective against the Stat3 clones than the parental or vector cell lines, which do not express constitutively active Stat3. We transfected cells with different

levels of Stat3, creating two lines of clones. We then examined the 4 cell lines in the presence and absence of the compounds. Cell Proliferation/ viability was assessed using an MTT assay and Invasion was examined with a Matrigel assay. Data suggested that ACA and EGCG blocked invasion and ACA blocked growth of the cells, whereas ATRA had no effect on either parameter. There did not appear to be any differential effect of these 3 compounds on the Stat3 clones versus the parental or vector cell lines. Thus, we concluded that these compounds did not modulate events upstream of Stat3. Additional assays must be conducted for result verification.

INVESTIGATING THE INTERACTION BETWEEN CALCIUM OXALATE MONOHYDRATE AND PHOSPHOLIPID MEMBRANES

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Calcium oxalate monohydrate (COM) is the major toxic metabolite of ethylene glycol (EG) breakdown. Past research has suggested that COM may selectively interact with membranes, possibly with the phospholipid components. Our investigation used dipalmitoylphosphatidylcholine (DPPC) and dipalmitoylphosphatidylserine (DPPS) liposomes to provide experimental evidence of this point. Liposomes were formed by rotary evaporation of solvent from the lipid, followed by resuspension in PBS buffer, and sonication to provide an even mixture. A liposome extruder was then used to create 100 nm liposome vesicles. The transition phase temperature peak (TM) and corresponding peak area of vesicles were analyzed on a differential scanning calorimeter (DSC) in the absence and presence of various concentrations of COM. In addition, aluminum citrate (AlC) was added to DPPS liposome samples to test its inhibitory effect on COM action. The results showed that neither the TM peak or peak area of DPPC was altered by increasing concentrations of COM. In DPPS liposomes, peak temperatures increased and peak area declined concentration-dependently with COM. When AlC was added to COM-treated samples, peak areas increased back to control levels at 0.2 mM AlC. These results suggest that COM causes a structural change in the membrane by selectively altering phosphatidylserine structure, and AlC may be able to inhibit this effect.

Effects of acute and chronic treatment with low-concentration combinations of metyrapone and oxazepam on behavior in the elevated plus maze

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The relationship between stress exposure and anxiolytic efficacy is an important area of research since stress is a major contributor to the development of drug-seeking behavior in humans. In my specific research, I target drug-seeking behavior and the related anxiety/stress levels by testing three different combinations of low-concentration oxazepam and metyrapone in a rat model. This experiment investigates the specific combination that yields the least amount of sedation and unwanted side-effects while also exhibiting the least amount of anxiety. After my final data analysis, I observed a statistically significant decrease in overall anxiety when the lowest dose combination was administered. This drug combination will be tested in the near future in order to test its full capacity and side effects when it is used to lower drug-seeking behavior.

The Obesity Associated Adipokine Leptin Stimulates a Pro-inflammatory Phenotype

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The causes of Non-alcoholic Steatohepatitis (NASH) are currently unknown. However, it has been suggested that a protein hormone known as leptin is a potential mediator the inflammation associated with NASH. Thus the current project was designed to evaluate the effects of leptin on hepatic cells. Using an *in vitro* cell culture system, C3A hepatocytes were grown to confluence and treated with leptin (7.8ng/mL-125ng/mL). After 24h, mRNA expression and protein levels of various inflammation markers were examined using quantitative PCR and ELISA. Also a concurrent *in vivo* study was performed using male Wistar rats, which were inoculated with leptin (1mg/kg, 4 and 24h). In the *in vitro* model, the effects of leptin were pro-inflammatory. ICAM-1 increased 1.5-fold above untreated control cultures. In addition, production of MCP-1 and IL-6 in leptin-treated hepatocytes was also increased significantly.

In contrast, the anti-inflammatory hormone adiponectin was decreased in leptin-treated rats. Also, serum ICAM-1 and ALT both increased significantly in the leptin-treated rats. Finally intravital microscopy of microvessels in rats treated with leptin revealed that leptin promotes a 3-fold increase in both rolling and firm adhesion. In summary, leptin promotes a pro-inflammatory response in cultured hepatocytes as well as in vessels of rats.

The Effects of Urbanization on the Allelic Variation of the Pacific Tree Frog, *Hyla regilla*, in the Santa Monica Mountains.

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Urbanization can be described as the development of land for road construction, building erection, and agricultural cultivation. Common effects of urbanization in the Santa Monica Mountain watersheds include a change of hydrology, introduction of pollutants, an increase of nutrients that leads to sedimentation and erosion, and the induction of non-native invasive species into the streams. Previous research has noted that a lower amphibian population has been detected in steams that are considered urbanized (>8% surrounding impervious surface) when compared to non-urbanized streams. In an effort to gain more knowledge about the effects of urbanization on Pacific Tree Frog, *Hyla regilla*, populations, the allelic variation of specific microsatellite loci amongst three populations were determined (two non-urbanized and one urbanized stream). Microsatellites are short, non-coding repeats of DNA that are 100-300 base pairs in length that are a common tool in the study of evolution and population genetics. Two variable and scoreable microsatellite loci were amplified. Analyses of the allelic data indicated that the *H. regilla* populations from the urbanized stream did not show a significant difference when compared against the non-urbanized controls, which could support for the possibility of the one large population of Pacific Tree Frogs that spreads across the Santa Monica Mountains.

Social Sciences

Race Differences in Subjective Social Class Decisions

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In previous works (Jackman & Jackman, 1973; Smith, 1985; Ostrove, et al, 2000) the differences between Whites' and Blacks' subjective social class identification was noted, and there were significant differences between the two races concerning how each made social class decisions. This study reevaluates these findings with more recent data and definitive terms. A cross section of Americans, taken from the General Social Survey, was used to analyze the objective variables typically associated with social class and respondents' subjective social class decisions. Significant differences in the variables used to determine one's social class are found between Whites and Blacks.

The Implicit Relationship between Religious and Supernatural Phenomena

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Previous research in the field of psychology of religion has looked at the explicit relationship between religious beliefs and supernatural phenomena, however they have neglected to look at this relationship from am implicit perspective. The current study attempts to investigate this implicit relationship with the use of a Paper and Pencil IAT in order to determine how intrinsically- and extrinsically-religious individuals unconsciously group the two constructs of religion and supernatural phenomena on an implicit level. Thus far, the study results have shown individuals who are more intrinsically motivated tend to separate these two constructs as two distinct categories.

An Implicit Measure of Religiousness

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Researchers currently rely on the use of participants' conscious (explicit) representations of themselves to measure intrinsic religiousness (religiousness for internal, affectional reasons). The use of explicit measures does, however, present a problem since explicit measures are susceptible to participant biases. We attempted to develop a measure of intrinsic religiousness which could access the extent to which an individual unconsciously (implicitly) identifies with religion. Such an implicit measure would reduce the possibility of participant bias. The intrinsic religiousness measure proposed employs a version of the Implicit Association Test (IAT) in which self-related words (e.g. me, mine) were paired with either religious words (e.g. church, prayer) or nonreligious words (e.g. truck, book). More intrinsically religious individuals were expected to have faster response times when self words were paired with religious words than when self words were paired with nonreligious words. Results from the implicit test were compared to results from an explicit measure.

Confidence as a Mediator between Transformational Leadership and Satisfaction in a Sports Setting

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Ample amounts of previous research investigated transformational leadership and its effects on performance and satisfaction; however, little research discusses transformational leadership and the effect it has in a sports setting. Transformational leadership is defined as a charismatic, motivational form of leadership. The purpose of this study was to investigate whether transformational leadership increased sports confidence, which then would increase satisfaction and intrinsic motivation. In order to test the theory, we administered a survey to Division I athletes to determine whether their current coaches were transformational leaders, the athletes' state of sports confidence in comparison with the most confident athlete they know, their satisfaction as an athlete, and their

intrinsic motivation. We controlled for athlete sex, class year in school and sport played. Results indicated that transformational leadership significantly predicted confidence, and that confidence significantly predicted satisfaction, which supported our hypothesis that confidence is a mediator of the relationship between transformational leadership and satisfaction. However, transformational leadership and confidence did not significantly predict intrinsic motivation.

Jet Fuel Prices and the Market Price of Common Stock

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The airline industry is a crucial sector for the economy. It ties international investment and promotes tourism, thus connecting markets and facilitating trade. The industry's net value had reached $95.8 billion by the end of 2004. Yet total operating revenues of $99.3 billion did not offset total operating expense of $102.7 billion. As a result, U.S. Airlines reported $3.3 billion loss for year ended 2004. Increase in the price of labor and fuel cost presents a new threat to the successful recovery of the 9/11 legacy. Consequently, the prices of stock decreased sharply as shareholders liquidated their investments. Restructuring the industry and regaining investors' trust is a challenge for the U.S. Airlines in the era of globalization.

The purpose of the research is to examine the change in jet fuel prices and its effect on the price of common stock. Data of five major airlines: American Airlines, Continental Airlines, Delta Airlines, Northwest Airlines, and Southwest Airlines is utilized to conduct the research over the time period 1996-2005. The result of the study allows observation of how major airlines handle the cost of jet fuel during recession and recovery. Further, mathematical and statistical models will be developed to determine the correlation between the inputs.

Narratives as Tools for Recruiting and Sustaining Group Members: A Case Study in Social Movement Organizations

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Structuring collective action, given diverse human thoughts, feelings, and behavior, is an arduous task and quite a social accomplishment. This paper examines one way collective action can be facilitated by analyzing how social movement organizations (SMOs) use narratives as a key resource for recruiting members and sustaining participation. Data for this analysis were collected through participant observation and in-depth interviews with 33 participants of the Soulforce Equality Ride, a two-month, cross-country bus journey—modeled after the Freedom Ride of the Civil Rights Movement—that toured 18 colleges and universities that ban the enrollment of gay, lesbian, bisexual, and transgender students. Findings indicate that, to recruit participants, maintain commitment to the group and its cause, and meet organizational goals, SMOs must: 1) craft a narrative that successfully taps into potential members' existing emotions, ideologies, and experiences; 2) align these individual experiences with group messages and meanings; and 3) create positive and validating feelings for members. In doing so, SMOs can construct cognitive and emotional links between the individual and the SMO, thereby shoring up participation and promoting group goals.

HUMANITIES

SOUTHERN ALIENATION AND THE REBUILDING OF A NEW SOUTH

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During the decades following the Civil War, the South changed not only physically and economically but also intellectually and emotionally. Following World War I, this change was reflected in work by such writers and intellectuals as John Crowe Ransom, William Faulkner, Robert Penn Warren, and Eudora Welty in a literary revival known as the "Southern Renaissance." According to Allen Tate, the change in the "Southern mind" meant a shift from a "rhetorical mode" of imagination and discourse to a "dialectical" one, which brought a critical examination of the culture and personal introspection. For the first time, Southerners were discovering a self apart from family, place, and community, and the more complex identity that emerged was often characterized by an essential sense of loneliness, isolation from the very region that once formed their identity. The problem of identity due to this alienation wrought by cultural change became a major concern of the Southern Renaissance--a matter for examination in three important mid-century novels: William Faulkner's Go Down, Moses (1942), Robert Penn Warren's All the King's Men (1946), and James Agee's A Death in the Family (1957).

The Captive Lolita: Critical Approaches to Nabokov's Lolita and the Nature of Captivity

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More than fifty years ago Vladimir Nabokov's Lolita faced outright rejection by American critics and publishers, many of whom considered it sheer pornography. Yet, upon its release in America three years after it was first published in Paris, it became an instant bestseller. Today it is ranked fourth on Random House's list of the 100 best novels. The rhetoric of Lolita fascinates as the reader comes to both sympathize with and detest Humbert Humbert, the seemingly omnipotent captor. With sophisticated rhetoric, his despicable deeds become reasonable.

Though Lolita's name is the title as well as the first and last words of the novel, her voice is rarely heard, and then heard only filtered through the voice of her captor. Critical examination of the text gives insight into the connection between masculine power structures and feminine lives, not only in America but also in repressive religious and political cultures such as Iran's. Just as Nabokov's Humbert reveals something about the reader's nature by revealing himself, examining American perceptions of foreign "captivity" can be similarly, surprisingly revealing about the nature of social captivity in America.

DANGEROUS BEAUTIES: WOMEN IN SCIENCE FICTION AND FANTASY

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While science fiction and fantasy have traditionally been male-dominated genres, they are increasingly being taken over by strong female heroines. From Sarah Connor in The Terminator to the feisty blonde heroine of Buffy the Vampire Slayer, these women kick butt while still maintaining their sex appeal. My presentation will explore whether these characters are positive role-models for women, or simply objects to gratify the male gaze. Would these characters still be as popular if they were not as beautiful? Does their image of perfect feminine beauty undermine any otherwise positive messages? I will also look at these characters in light of the heroic tradition and explore how these female heroines uphold or subvert the traditionally masculine ideal of the heroic.

JESUS AT WAR: A SOCIO-CULTURAL EXPLORATION OF THE CHARACTER OF JESUS IN THE GOSPEL OF MARK

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My intent is to examine the gospel of Mark in its historical social-political context it is not to recreate a historical Jesus like John Dominic Crossan, Richard Horsley, and others but to understand in the most precise historical terms possible Mark's use of the character Jesus to address the turmoil and oppression of Mark's present situation of rebellion and war in first century Palestine. This examination of Mark will undoubtedly present us with disturbing parallels between the tyrannies of ancient empire and modern Western Imperialism and a characterization of Jesus that has more in common with present day resistance groups and terrorists than the citizens of western nations.

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